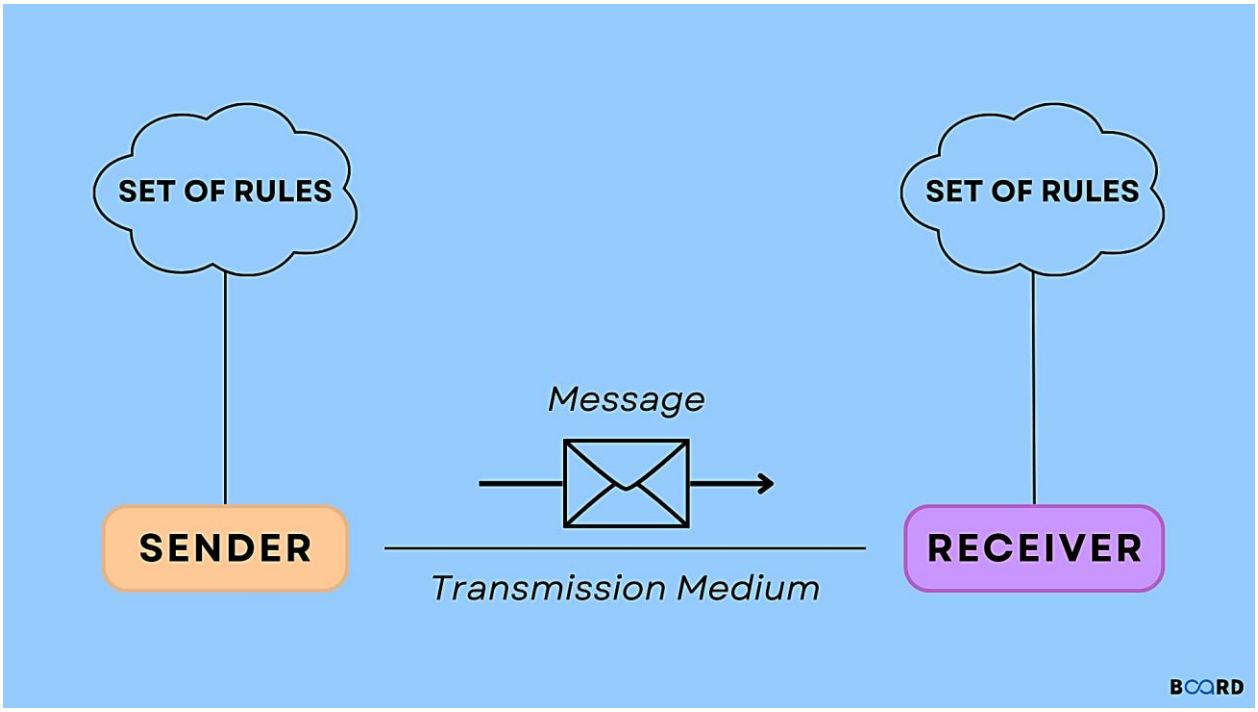
➢ EXPLAIN DATA COMMUNICATION.

Data communication is the transfer and flow of data from one place to another. Learn all about how it works and careers in data communication.

Just like humans communicate in a variety of ways—by speaking, texting, and emailing—data similarly transfers from one place to another using different mediums.

This process of moving electronic and digital data is called data communication.



A common example of data communication is connecting your laptop to a Wi-Fi network. This action requires a wireless medium to send and receive data from remote servers.

➢ EXPLAIN COMPONENTS OF DATA COMMUNICATION.

A data communication system is comprised of the following:

1. Message: The data to be transmitted or communicated, which can include numbers, text, photos, sound, or video.
2. Sender: The computer or device (e.g., phone, tablet) that sends the message.
3. Receiver: The computer or device that receives the message, which can be different from the sender.
4. Medium: The channel through which the message is carried from sender to receiver, such as twisted pair wire, coaxial cable, fiber optic cable, or wireless.
5. Protocol: The set of rules that govern the communication between computers. These rules are followed by both the sender and receiver.

➢ EXPLAIN COMPUTER NETWORK.

A computer network is a group of interconnected nodes or computing devices that exchange data and resources with each other.

A network connection between these devices can be established using cable or wireless media.

Once a connection is established, communication protocols -- such as TCP/IP, Simple Mail Transfer Protocol and Hypertext Transfer Protocol -- are used to exchange data between the networked devices.

The first example of a computer network was the Advanced Research Projects Agency Network. This packet-switched network was created in the late 1960s by ARPA, a U.S. Department of Defense agency.

A computer network can be as small as two laptops connected through an Ethernet cable or as complex as the internet, which is a global system of computer networks.

➢ EXPLAIN ADVANTAGE OF COMPUTER NETWORK

Computer networks are ideal for the quick exchange of information and the efficient use of resources.

The following are benefits of using a computer network:

Resource sharing. Enterprises of all sizes can use a computer network to share resources and critical assets. Resources for sharing can include printers, files, scanners and photocopy machines. Computer networks are especially beneficial for larger and globally spread-out organizations, as they can use a single common network to connect with their employees.

Flexibility. Today's computer networks enable people to use flexible communication and resource-sharing methods based on their needs and preferences. For example, some people might use email or instant messaging to communicate, while others might prefer using an app such as WhatsApp.

Higher connectivity. Thanks to computer networks, people can stay connected regardless of their location. For example, video calling and document-sharing apps, such as Zoom and Google Docs, enable employees to connect and collaborate remotely.

Data security and management. In a computer network, data is centralized on shared servers. This helps network administrators to better manage and protect their company's critical data assets. They can perform regular data backups and enforce security measures, such as multifactor authentication, across all devices collectively.

Storage capacity. Most organizations scale over time and have an abundance of data that needs storage. Computer networks, especially those that employ cloud-based technologies, can store massive amounts of data and backups on a centralized remote server that's accessible to everyone, at any given time.

Entertainment. Computer networks, especially the internet, offer various sources of entertainment, ranging from computer games to streaming music and videos. Multiplayer games, for example, can only be operated through a local or home-based LAN or a wide area network (WAN), such as the internet.

➢ EXPLAIN ADVANTAGE OF COMPUTER NETWORK.

A network is very useful for connection and communication purposes. Not just that, it also has many other advantages. Below are some of the prominent ones:

1. Ease of accessibility
2. Flexibility
3. Convenient resource sharing
4. Connectivity
5. Security
6. Great storage capacity
7. Reduced cost
8. Enhanced Collaboration
9. Open to Everyone
10. Backup & Storage

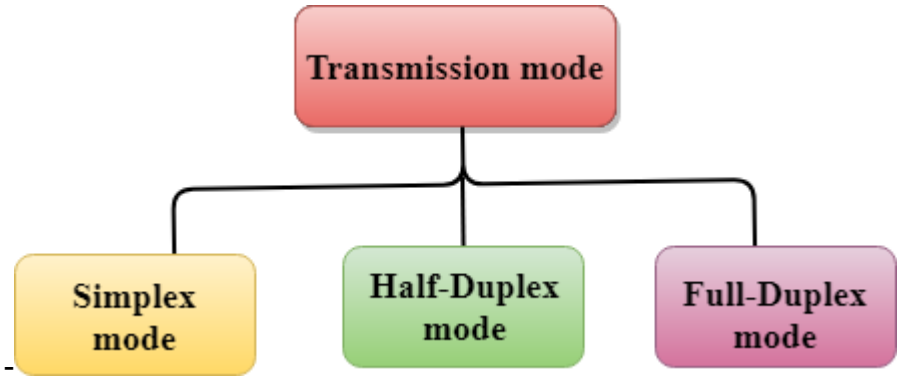
➢ EXPLAIN DATA TRANSMISSION MODES.

Transmission mode means transferring data between two devices.

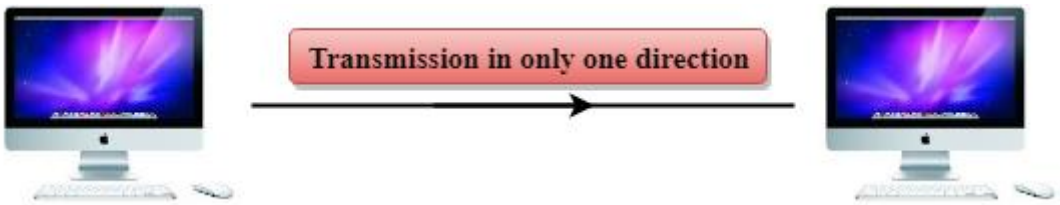
It is also known as a communication mode. Buses and networks are designed to allow communication to occur between individual devices that are interconnected.

The Transmission mode is divided into three categories:

1. Simplex mode
2. Half-duplex mode
3. Full-duplex mode



SIMPLEX MODE



In Simplex mode, the communication is unidirectional, i.e., the data flow in one direction.

A device can only send the data but cannot receive it or it can receive the data but cannot send the data.

This transmission mode is not very popular as mainly communications require the two-way exchange of data. The simplex mode is used in the business field as in sales that do not require any corresponding reply.

Keyboard and Monitor are the examples of the simplex mode as a keyboard can only accept the data from the user and monitor can only be used to display the data on the screen.

The main advantage of the simplex mode is that the full capacity of the communication channel can be utilized during transmission.

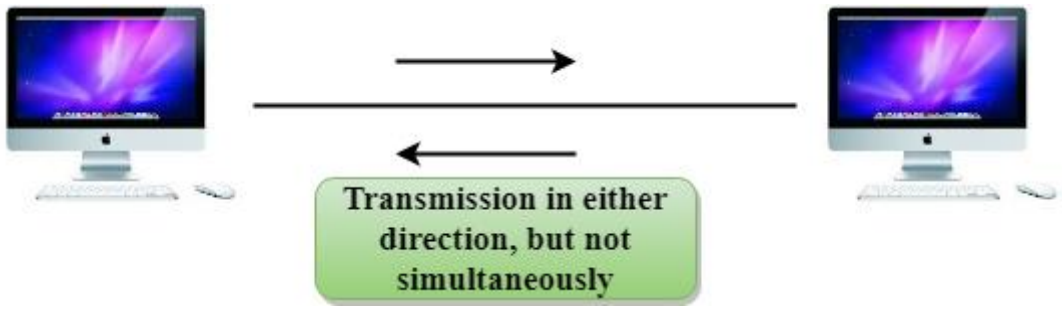
Advantage of Simplex mode:

In simplex mode, the station can utilize the entire bandwidth of the communication channel, so that more data can be transmitted at a time.

Disadvantage of Simplex mode:

Communication is unidirectional, so it has no inter-communication between devices.

HALF DUPLEX MODE



In a Half-duplex channel, direction can be reversed, i.e., the station can transmit and receive the data as well.

Messages flow in both the directions, but not at the same time.

The entire bandwidth of the communication channel is utilized in one direction at a time.

In half-duplex mode, it is possible to perform the error detection, and if any error occurs, then the receiver requests the sender to retransmit the data.

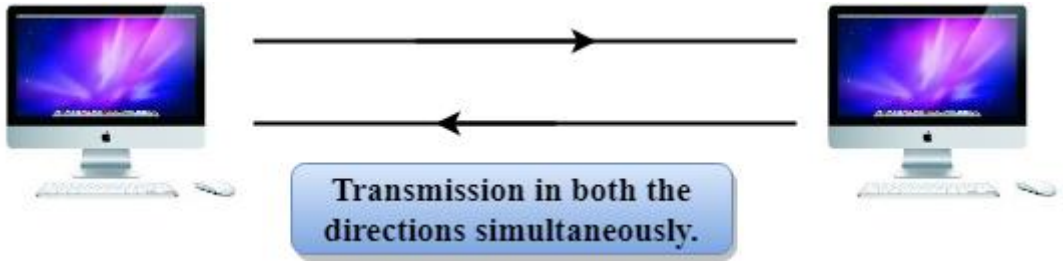
Advantage of Half-duplex mode:

In half-duplex mode, both the devices can send and receive the data and also can utilize the entire bandwidth of the communication channel during the transmission of data.

Disadvantage of Half-Duplex mode:

In half-duplex mode, when one device is sending the data, then another has to wait, this causes the delay in sending the data at the right time.

FULL DUPLEX MODE



In Full duplex mode, the communication is bi-directional, i.e., the data flow in both the directions.

Both the stations can send and receive the message simultaneously.

Full-duplex mode has two simplex channels.

One channel has traffic moving in one direction, and another channel has traffic flowing in the opposite direction.

The Full-duplex mode is the fastest mode of communication between devices.

The most common example of the full-duplex mode is a telephone network. When two people are communicating with each other by a telephone line, both can talk and listen at the same time.

Advantage of Full-duplex mode:

Both the stations can send and receive the data at the same time.

Disadvantage of Full-duplex mode:

If there is no dedicated path exists between the devices, then the capacity of the communication channel is divided into two parts.

➢ EXPLAIN TYPES OF COMPUTER NETWORK.

A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share its resources, data, and applications.

Their size can categorize a computer network. A computer network is mainly of four types:

- LAN (Local Area Network)
- PAN (Personal Area Network)
- MAN (Metropolitan Area Network)
- WAN (Wide Area Network)

LOCAL AREA NETWORK (LAN)

Local Area Network is a group of computers connected to each other in a small area such as building, office.

LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.

It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and ethernet cables.

The data is transferred at an extremely faster rate in Local Area Network.

Local Area Network provides higher security.

PERSONAL AREA NETWORK

Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.

Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.

Thomas Zimmerman was the first research scientist to bring the idea of the Personal Area Network.

Personal Area Network covers an area of 30 feet.

Personal computer devices that are used to develop the personal area network are the laptop, mobile phones, media player and play stations.

METROPOLITIAN AREA NETWORK (MAN)

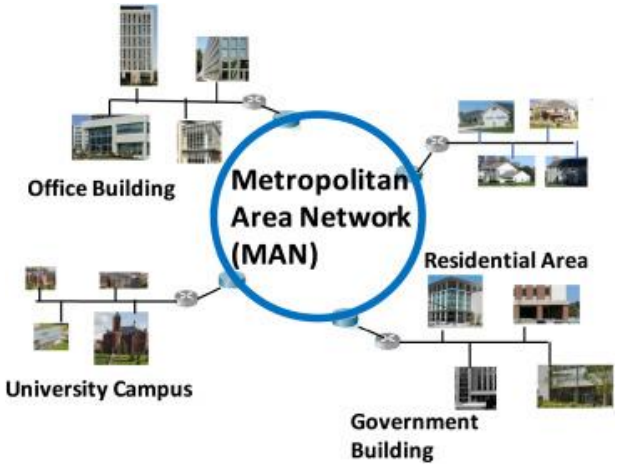
A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.

Government agencies use MAN to connect to the citizens and private industries.

In MAN, various LANs are connected to each other through a telephone exchange line.

The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.

It has a higher range than Local Area Network(LAN).



WIDE AREA NETWORK (WAN)

A Wide Area Network is a network that extends over a large geographical area such as states or countries.

A Wide Area Network is quite bigger network than the LAN.

A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fibre optic cable or satellite links.

The internet is one of the biggest WAN in the world.

A Wide Area Network is widely used in the field of Business, government, and education.